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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,351	08/13/2001	Konstantin Kupeev	KUPEEV=1	6087
1444	7590	12/14/2004	EXAMINER	
BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			DASTOURI, MEHRDAD	
			ART UNIT	PAPER NUMBER
			2623	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

09/927,351

### Applicant(s)

KUPEEV ET AL.

### Examiner

Mehrdad Dastouri

### Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-20, 22-32 and 34-36 is/are rejected.
- 7) ☒ Claim(s) 9, 21 and 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8, 10-20, 22-32 and 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Kupeev et al. (hereinafter Kupeev), (A New Method of Estimating Shape Similarity).

Regarding Claim 1, Kupeev discloses a method for analyzing an image comprising:

Constructing a graph to represent an object appearing in the image (Figures 1 and 2, G-graph  $G(K)$  for the image contour in Figure 1).

generating a string of symbols corresponding to the graph (Figures 1 and 2; Page 3, Section 2.1, string of symbols a to q representing the lumps or regions bounded in contour  $K$ ); and

processing the string so as to classify the object (Page 3, Section 2.1, in particular Page 3, Column 2).

Regarding Claim 2, Kupeev further discloses the method according Claim 1, wherein generating the string comprises generating first and second strings to represent first and second graphs, respectively, so that the first second strings are identical if and only if the first and second graphs are isomorphic (Figure 5; Page 5, Section 2.2).

Regarding Claim 3, Kupeev further discloses the method according Claim 2, wherein the graphs comprise vertices, and wherein constructing the graph comprises constructing the first and second graphs so that vertices of each of the graphs are arranged in a specified spatial relation, and wherein generating the first and second strings comprises the constructing the strings so as to reflect spatial relation of the vertices (Page 3, Section 2.1. Vertices of  $G(K)$  depicted in Figure 2 correspond to the lumps of contour  $K$ ; Section 2.2).

Regarding Claim 4, Kupeev further discloses the method according Claim 3, wherein constructing the graph comprises assigning the vertices to represent respective portions of a contour of a shape of the object in the image, and arranging the vertices in the specified spatial relation responsive relative positions in the image of the respective portions contour (Figures 1 and 2; Page 3).

Regarding Claim 5, Kupeev further discloses the method according Claim 4, wherein assigning the vertices comprises positioning Cartesian coordinate axes relative to the contour and determining the relative positions of the portions of the contour with respect to the axes, and wherein arranging vertices comprises positioning the vertices so as to preserve up/down and left/right relations of the positions of the portions of the contour (Figures 1 and 2; Page 3. Positioning of vertices preserves the relationship between parent and sibling are preserved by assigning higher Y-coordinate to parent (top to bottom) and relating sibling in X-direction indicating "left of" and right of".).

Regarding Claim 6, Kupeev further discloses the method according Claim 5, wherein constructing the graph comprises dividing a contour of a shape of the object in

the image into multiple portions, and assigning vertices of the graph respectively to represent the portions of the contour (Figures 1 and 2; Page 3, Section 2.1, Lumps a-q).

Regarding Claim 7, Kupeev further discloses the method according Claim 6, wherein dividing the contour comprises positioning Cartesian coordinate axes relative to the contour a plurality different orientation angles, and finding the portions of the contour at each of the angles (Page 3, Column 2, portions of the contour are found and classified at X-axis and Y-axis; Page 4, Section 2.2, Contours K  $\alpha$ ), and

wherein constructing the graph comprises constructing a plurality of respective graphs in which the vertices represent the portions of the contour at the different orientation at each of the angles (Figures 1-5; pages 3-5, Sections 2.1 and 2.2), and

wherein generating and processing the string comprise generating and processing a plurality of strings corresponding to the respective graphs so as to classify the shape (Page 3, Column 2, portions of the contour are found and classified at X-axis and Y-axis; Page 4, Section 2.2, Contours K  $\alpha$ ).

Regarding Claim 8, Kupeev further discloses the method according Claim 7, wherein constructing the graph comprises constructing a sequence of graphs that correspond to successively simplified versions of the contour and accordingly comprise successively decreasing numbers of the vertices (Pages 4-5, Section 2.2, Reduction to simplified contour similarity.), and

wherein generating and processing the string comprise generating and processing a plurality of strings corresponding to the respective graphs so as to classify

the shape (Page 3, Column 2, portions of the contour are found and classified at X-axis and Y-axis; Page 4, Section 2.2, Contours  $K \alpha$ ).

Regarding Claim 10, Kupeeov further discloses the method according Claim 1, wherein graph comprises vertices, and wherein generating the string of symbols comprises performing a depth-first search over the vertices of the graph, and adding one more symbols to the string for each edge encountered the search (Page 3, Column 2, depth-first search (DFS)).

Regarding Claim 11, Kupeeov further discloses the method according Claim 1, wherein processing the string comprises comparing the string to a reference string representing a reference object so as to assess similarity of the object to the reference object (Abstract; Pages3-4, Section 2.2; Figures 5-8).

Regarding Claim 12, Kupeeov further discloses the method according Claim 11, wherein comparing the string comprises computing a string distance between the string and the reference string, so as to calculate a measure of shape difference between the object and the reference object (Figure 8; Equation 10; Page 7; Section 2.5).

With regards to Claims 13 and 25, arguments analogous to those presented for Claim 1 are applicable to Claims 13 and 25.

With regards to Claims 14 and 26, arguments analogous to those presented for Claim 2 are applicable to Claims 14 and 26.

With regards to Claims 15 and 27, arguments analogous to those presented for Claim 3 are applicable to Claims 14 and 27.

With regards to Claims 16 and 28, arguments analogous to those presented for Claim 4 are applicable to Claims 16 and 28.

With regards to Claims 17 and 29, arguments analogous to those presented for Claim 5 are applicable to Claims 17 and 29.

With regards to Claims 18 and 30, arguments analogous to those presented for Claim 6 are applicable to Claims 18 and 30.

With regards to Claims 19 and 31, arguments analogous to those presented for Claim 7 are applicable to Claims 19 and 31.

With regards to Claims 20 and 32, arguments analogous to those presented for Claim 8 are applicable to Claims 20 and 32.

With regards to Claims 22 and 34, arguments analogous to those presented for Claim 10 are applicable to Claims 22 and 34.

With regards to Claims 23 and 35, arguments analogous to those presented for Claim 11 are applicable to Claims 23 and 35.

With regards to Claims 24 and 36, arguments analogous to those presented for Claim 12 are applicable to Claims 24 and 36.

***Allowable Subject Matter***

3. Claims 9, 21 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 9 of the instant invention recites the method according to Claim 8 wherein processing the plurality of the strings comprises arranging the strings as elements of a

Art Unit: 2623

first vector, indexed according to the numbers of the vertices in the corresponding graphs, and computing a measure of distance between the first vector and second vector, representing a reference contour and indexed in like manner to the first vector, so as to determine a similarity of the shape to the reference contour.

Claims 21 and 33 recite the apparatus and computer software product corresponding to the methodology recited in Claim 9, respectively, and are therefore allowable.

The features identified are neither discussed nor suggested by the prior arts of record.

***Other prior art cited***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,953,229 to Clark et al.;

U.S. Patent 5,841,900 to Rahgozar et al.

***Contact Information***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mehrdad Dastouri  
Primary Examiner  
Art Unit 2623  
December 9, 2004

MEHRDAD DASTOURI  
PRIMARY EXAMINER

*Mehrdad Dastouri*